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Southern Pine Beetle Fact Sheet
Number 9

USE OF BEHAVIORAL CHEMICALS FOR SOUTHERN PINE BEETLE SUPPRESSION --A RESEARCH UPDATE

Experiments with southern pine beetle (SPB) behavioral chemicals have been going on for 15 years. Several attractants and inhibitors play a role in the SPB's landing and attack behavior (Vite 1970, Vite and Francke 1976, Payne et al 1978). In nature, attractants orient flying beetles to a common host tree. By responding to chemicals, beetles arrive over a relatively short time in numbers sufficient to overcome the resistance of the host tree and successfully colonize it.

Results from work on attractants and inhibitors suggest that they should be considered as potential control tools for suppressing SPB. The attractants will likely be most useful in smaller infestations, providing the forester and pest management specialist a tactic for reducing or halting spot growth that cannot be handled by other methods. Inhibitors, on the other hand, may have potential for aerial application to control spot growth in larger, unmanageable infestations.

The attractant mixture frontalure (frontalin plus alpha-pinene) has been evaluated in a trap- tree application with the herbicide cacodylic acid (Vite 1970). The treatment was only partly effective (Coulson et al 1975). Frontalure was also evaluated in an aerial application in an attempt to disrupt the natural mass attack behavior of the SPB (Vite et al 1976). The treatment failed to halt spot growth; in fact, more trees were attacked in the treated areas.

Richerson, et al (1980) demonstrated that active spot growth could be stopped by baiting all dead host and nonhost trees with frontalure in an infestation. Although beetles emerged, they did not attack new trees at the edge of the spot. In subsequent field experiments in Georgia, frontalure was successfully used to halt spot growth (Payne et al; unpublished).

In nature, inhibitors redirect populations of flying beetles, from one fully occupied tree to a nearby, uninfested tree. As an attacked tree becomes colonized by a sufficient number of beetles, the population of flying beetles shifts to adjacent trees in response to inhibitors released from fully occupied trees. Early field bioassays have shown that the aggregation of SPB on attractant-baited traps can be significantly reduced by adding one or more inhibitors (endo- and exo-brevicomin) (Vite and Renwick 1971). In 1977, Payne et al, used a controlled-release formulation of the attractants and inhibitors to determine their effect on beetle flight and landing behavior. The inhibitors reduced landing trap catches on host trees by 70 percent. Later tests involving the use of verbenone and endo-brevicomin reduced landing even more (Richerson and Payne 1979).

Richerson and Payne (1979) subsequently found that brevicomin plus verbenone reduced landing of SPB by 80 percent when the pheromones were released from the surface of host trees. Egg gallery length was reduced by 92 percent in the same trees. But a new problem arose: Although SPB attacks were significantly reduced, attacks by the southern pine engraver (Ips avulsus (Eichhoff)) increased dramatically and eventually killed the trees. Additional trees were not killed, because of the apparent reduction in SPB brood and the fact that sufficient adults were not available to successfully attack trees or weaken them for attack by the less aggressive pine engraver beetle. Inhibitors, therefore, might be used to lessen tree mortality due to SPB. Competitive replacement by Ips might also be beneficial in the long run because the SPB spot could become inactive sooner than if left untreated.

More research work and EPA registration is needed before these approaches can be recommended for general use by forest managers.

This fact sheet was prepared by Dr. T.L. Payne, Department of Entomology, Texas A&M University, College Station, Texas.

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